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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 11

Application Number: 09/624,522
Filing Date: July 24, 2000
Appellant(s): BEUKER, ROB A.

Edward W. Goodman, Reg. 28,613
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 01/16/04.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

The rejection of claims 1, 4-7, and 2-3 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7), claim 8 stands and falls alone.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

US 5,473,379	Horne	12-1995

US 6,462,791	Zhu	10-2002
US 6,385,245	De Haan et al.	05-2002

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Horne (US 5,473,379).

Note the applicant discloses or describes the most-used global vector is also used as best global motion vector. Therefore, a most frequently occurring block-based motion vector is interpreted as a best block-based motion vector and a second second-most frequently occurring block-based motion vector is interpreted as a second best block-based motion vector.

Re claim 1, Horne discloses the same motion vector estimation method that comprises the steps: carrying out a block-based motion vector estimation process (104 of fig. 1) that involves comparing a plurality of candidate vectors to determine block-based motion vectors (302, 310, 312, 314, 316, 318 of fig. 3A; e.g. the step (312) compares the block DBi,t with several candidate displaced blocks to determine the best block-based motion vectors MVi,dt; see also col. 10, line 50 through col. 11, line 26);

determining at least a most frequently occurring block based motion vector (310 and 318 of fig. 3A; e.g. the step (318) determines the best block-based motion vector MVi,dt based upon the best matched block within the search window Aref that is defined by the step (310); see also col. 9, lines 30-35; col. 11, lines 21-24);

carrying out a global motion vector estimation process (106 of fig. 1) using at least the most frequently occurring block-based motion vector to obtain a global motion vector (401, 402, 403, 404, 405, 406, and 407 of fig. 4; e.g. the step (407) determines a global motion vector using the best block-based motion vector MVi,dt that is received from the block-based motion vector estimation process (322 of fig. 3A); see also col. 11, lines 29-32 , and col. 12, lines 29 through col. 13, line 16);

applying the global motion vector as a candidate vector to the block-based motion vector estimation process (330 of fig. 3A; e.g. the step (330) receives the global motion vector from the motion estimator (106 of fig. 1); see also col. 11, lines 47-58).

Re claim 4, Horne further discloses wherein both the most frequently occurring block-based motion vector and a second-most frequently occurring block-based motion vector are determined and used in the global motion vector estimation process (302, 310, 312, 316, 318, 322, 328 of fig. 3A; e.g. the step (318) determines the most frequently occurring block-based motion vector (the best block-based motion vector) in the frame that is transmitted by the step (322) to the global motion estimator (106 of fig. 1); if there are more blocks within the frame as shown in the step (328), a second best block-based motion vector (second-most frequently occurring block-based motion vector) is determined by the step (318) and then being transmitted

to the global motion estimator (106 of fig. 1) by the step of (322); see also col. 11, lines 29-31, 47-56).

Re claim 5, Horne further discloses wherein said global motion vector estimation process includes the steps of comparing,

on a block basis (col. 12, lines 12-14; e.g. the global motion estimator (106 of fig. 1) generates a global motion vectors for a video frame by estimating the component of motion common to every block (block basis) in the entire frame, and using block matching with respect to any reference frame),

a plurality of candidate vectors, including the most frequently occurring block-based motion vector, to obtain best vectors determined per block (401 of fig. 4; e.g. the best motion vector MVi,dt is calculated by comparing the DBi,t with candidate displaced blocks, best matched block within Aref, see also col.10, line 56 through col. 11, line 1, 29-31; col. 12, lines 29-32);

and outputting a most-frequently occurring best vector determined per block as the global motion vector (405 of fig. 5; the best motion vector is determined in the step (407) of the global motion estimator (106 of fig. 1) to output the global motion vector to the motion compression device).

Re claim 6, Horne further discloses A motion vector estimation device, comprising:

block-based motion vector estimation means for determining block-based motion vectors based on a comparison of a plurality of candidate vectors (104 of fig. 1; 302, 310, 312, 314, 316,

and 318 of fig. 3A; e.g. the step (312) compares the block DBi,t with several candidate displaced blocks to determine the best block-based motion vectors MVi,dt; see also col. 10, line 50 through col. 11, line 26);

means for determining at least a most frequently occurring block-based motion vector (104 of fig. 1; 310 and 318 of fig. 3A; e.g. the step (318) determines the best bock-based motion vector MVi,dt based upon the best matched block within the search window Aref that is defined by the step (310); see also col. 9, lines 30-35; col. 11, lines 21-24);

means for carrying out a global motion vector estimation process using at least the most frequently occurring block-based motion vector to obtain a global motion vector (106 of fig. 1; 401, 402, 403, 404, 405, 406, and 407 of fig. 4; e.g. the step (407) determines a global motion vector using the best block-based motion vector MVi,dt that is received from the block-based motion vector estimation process (322 of fig. 3A); see also col. 11, lines 29-32 , and col. 12, lines 29 through col. 13, line 16); and

means for applying the global motion vector as a candidate vector to the block-based motion vector estimation means (106 of fig. 1; 330 of fig. 3A; e.g. the step (330) receives the global motion vector from the motion estimator (106 of fig. 1); see also col. 11, lines 47-58).

Re claim 7, Horne further discloses a motion-compensated picture signal processing apparatus, comprising:

a motion vector estimation device for generating motion vectors (104 and 106 of fig. 1); and a motion-compensated processor for processing a picture signal in dependence on the motion vectors (104 and 105 of fig. 1; e.g. the block-based motion estimator (104) further includes

motion compensation means considered as a motion-compensated processor for providing displaced block data to the subtraction node (105), see also col. 4, lines 49-55).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horne (US 5,473,379) as applied to claim 1, and further in view of Zhu (US 6,462,791).

Re claims 2 and 3, Horne suggests means for generating an error signal representing the difference in pixel luminance and chrominance between two video data blocks received from the motion estimator (104 of fig. 2), and the means absolute difference used to calculate the difference between the total pixel luminance for the new block and the total pixel luminance value for each candidate displaced block (maximum and minimum values).

Horne does not particularly disclose making a selection among block-based motion vectors having a corresponding motion error below a given motion error threshold; and making a selection among block-based motion vectors estimated for blocks having a difference between maximum and minimum pixel values above a given activity threshold as claimed.

However, Zhu teaches making a selection among block-based motion vectors having a corresponding motion error below a given motion error threshold (col. 4, lines 65-67; e.g. the absolute difference DA < threshold TA, the motion vector Vi set to the best matched motion

vector Abest), and making a selection among block-based motion vectors estimated for blocks having a difference between maximum and minimum pixel values above a given activity threshold (col. 5, lines 15-20; the absolute difference between the maximum pixel value (V1 of fig. 5) and minimum pixel value (V2 of fig. 5) is above the threshold TA, the motion vector set to zero Vi=0).

Therefore, taking combined teachings of Horne and Zhu as a whole, it would have been obvious to one of ordinary skill in the art to implement making the selection among block-based motion vectors of Zhu (col. 4, line 51 through col. 5, line 27) into the motion estimation device (104 and 106 of fig. 1) of Horne for the same purpose of making the selection among block-based motion vectors (best block-based motion vectors) so that the encoder/coder encodes the motion vectors according to those best motion vectors as suggested by Zhu (col. 3, line 65 through col. 4, line 3). Doing so would allow the motion compensation to improve the efficiency of the prediction of pixel values for high compression rates which maintains packet loss resiliency as suggested by Zhu (col. 1, lines 43-45; col. 2, lines 59-63).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horne (US 5,473,379) as applied to claims 6 and 7, and further in view of De Haan et al. (US 6,385,245 B1).

Re claim 8, Horne teaches a motion-compensated picture signal processing apparatus comprises the motion estimator (104 and 106 of fig. 1) included motion compensation means (col. 4, lines 53-55) to obtain a processed picture signal, but Horne does not particularly teaches a display device for displaying the processed picture signal as claimed.

However, De Haan teaches a display unit (device) (D of fig. 2) for displaying the output video (processed picture signal) from the median filters MED1 and MED2 of motion compensation (col. 4, lines 6-25). Therefore, taking combined teachings of Horne and De Haan as a whole, it would have been obvious to one of ordinary skill in the art to implement the display unit (device) (D of fig. 2) of De Haan into the motion estimation device (100 of fig. 1) of Horne for the same purpose of displaying the processed picture signal as suggested by De Haan (col. 4, lines 6-25). Doing so would allow the motion estimator to reduce complexity of computation vector and keep the cost of the implementation as low as possible as suggested by De Haan (col. 2, lines 2-5; col. 9, lines 29-33).

(11) Response to Argument

The appellant argued that Horne discloses that GM is being used to determine the window Aref, and the GM is not used anywhere else in determining the best block-based motion vector, where claim 1 states "carrying out a block-based motion vector estimation process that involves comparing a plurality of candidates vectors to determine block-based motion vectors", and "applying the global motion vector as candidate vector to the block-based motion vector estimation" as claimed, pages 5 and 6 of the appeal brief.

The examiner respectively disagrees with the appellant. It is submitted that Horne discloses a global motion vector estimation process (106 of fig. 1) using at least the most frequently occurring block-based motion vector (104 of fig. 1, e.g. wherein the block-based motion vectors are determined by the motion estimator (104)) to obtain a global motion vector (401, 402, 403, 404, 405, 406, and 407 of fig. 4; e.g. the step (407) determines a global motion

vector using the best block-based motion vector MVi,dt that is received from the block-based motion vector estimation process (322 of fig. 3A); see also col. 11, lines 29-32 , and col. 12, lines 29 through col. 13, line 16). It is noted that the appellant describes comparing a plurality of candidate vectors to determine block-based motion vectors as " each candidate is checked to see whether the resulting address is valid, i.e., points to an area within the frame" in the specification page 4, lines 17-19. Horne discloses the motion estimator (104 of fig. 1) estimates block-based motion vectors using a plurality of candidate vectors (col. 7, lines 33-50); and Horne further describes comparing a plurality of candidate vectors as shown in step 312-314 of fig. 3A (see also col. 10, line 50 through col. 11, lines 1; e.g. the block DBi,t is compared to several candidate displaced blocks in the search window in order to determined the candidate block the least image difference). Moreover, Horne further discloses applying the global motion vector as a candidate vector to the block-based motion vector estimation process (col. 13, lines 17-22, e.g. the global motion vector (408 of fig. 4) is provided to the motion estimator (104 of fig. 1) in order to performing the method as shown in fig. 3A, so the global motion vector is considered as candidate vector). In view of the discussion above, Horne anticipated the claimed feature.

With respect to claim 4, the appellant argued that there is not mentioned in Horne whatsoever of using "second most frequently occurring vector" in determining the global motion vector, page 6 and 7 of the remarks. The examiner respectfully disagrees with the appellant. It is further submitted that Horne teaches the global motion estimator (106 of fig. 1) determine the global motion vectors for very block in the entire frame (col. 12, lines 13-19), and another block used to determine a global motion vector (col. 12, lines 29-64, e.g. another motion

vector is expected for the current frame, the program returns to the step (401 of fig. 4)), so this is considered as using second most frequently occurring vector to obtain the global vector. Since Horne discloses the global motion vector is used as a candidate vector in a block-based motion vector estimation process that involves comparing the plurality of candidate vector to determine a motion vector above, so one skilled in the art would incorporate Zhu and De Haan et al. into Horne to make obvious claimed invention as shown in the paragraph 10, ***Grounds of Rejection***.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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February 27, 2004

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